

## Step 5: Synthesis and Interpretation

### Purpose

To compare existing and reference conditions of specific ecosystem elements.

To explain significant differences, similarities, or trends and their causes.

To identify the capability of the system to achieve key management plan objectives.

## Soil Resources

### Erosion Processes

Although accelerated erosion continues to occur on some areas of the watershed where off-road vehicles have pioneered trails and roads, where soils are disturbed on steeper slopes, and where naturally erodible geologic formation occur, other restoration and management practices are improving vegetation conditions and improving ground cover that helps protect soils from erosion. Ecological units in the watershed have been rated for erosion potential based on the erosion factor and slope shown in Table 20.

**Table 20 Erosion Potential for Ecological Units in Blue Creek Watershed.**

Ecological Unit	Landform Position	Erosion Factor (Kw)*/T Factor	Potential Erosion	Acres
1123	Plains Caldera	0.32-0.43/ T=5, 2	Low to High	23
1140	Unstable Mountains	0.24/T=5	Moderate	194
1149	Mountains & Foothills	0.15 / T=5	Low	2535
1150	Mountains & Foothills	0.17 / T=5	Low	13009
1170	Mountain Summits	0.05 / T=2	Moderate	533
1172	Mountains	0.05-0.20/T=2, 3	Moderate	194
1175	Unstable Mountains	0.15 / T=5	Low	826
1228	Plains and Shields	0.32 / T=5	Low	186
1270	Mountains	0.17 / T=2	High	2969
1315	Mountains & Foothills	0.20.32/T=4, 5	Moderate	6026
1316	Mountains	0.10-0.28/T=4	Moderate to Low	714
1400	Outwash Plains	0.2 / T=3	Moderate	177
1592	Mountains & Foothills	0.15 / T=5	Low	469
1594	Mountains/Tablelands	0.10 / T=4	Low	798
1700	Tablelands	0.28 / T=4	Moderate	6411
1720	Tablelands	0.24-0.28/T=4	Moderate	4109
1730	Tablelands	0.28-0.24/T=4, 2	Moderate	1165
1760	Alluvial Fans/Terraces	0.28 / T=3	Moderate	1053
2020	Outwash Plains	T=3, 2	Moderate	142
2040	Outwash Plains	0.24-0.49/T=2	High	1376
2606	Floodplain	0.28 / T=3	Moderate	163
4120	Outwash Plains	0.32 / T=4	Moderate	39
Totals				51,794

\*Kw is a relative value that quantifies the susceptibility of the soils, including rock fragments, to be detached by water.

### ***Mountains and Foothills***

Soils on mountains and foothills generally have a moderate erosion potential with less than 3,000 acres having high potential. However, most soils that have good protective ground cover have natural background erosion rates. The trend appears to be stable or slightly upward under the current management strategy. Similarly, soils that formed beneath forested vegetation appear to be stable with little erosion occurring due primarily to canopy cover and ground cover. Unauthorized roads, trails and dispersed camp sites created by recreation users continue to reduce ground cover and create erosion on these soils. Erosion continues on non-maintained roads and trails and areas where disturbances have reduced ground cover. Any measures taken to obliterate existing road prisms that have been closed to use will improve watershed conditions on these landforms.

### ***Caldera Floor, Tablelands and Plains***

Soils on the caldera floor, tablelands and plains have low to moderate erosion potential and tend to erode more slowly when ground cover is removed because of gentle slopes. Areas identified as a concern in these ecological units are unauthorized OHV trails and roads on many of the lower drainage canyons, livestock effects located in Bootjack drainage and dispersed camping by recreationists in riparian areas. These areas, though not extensive in the watershed, have potential to deliver substantial amounts of sediment into nearby streams and reduce long-term site productivity in these areas. When considering watershed improvement projects on these sites, priority should be given to restoring ground cover and controlling erosion on the uplands where a downward trend is identified in the watershed improvement inventory. From this analysis, less than 200 acres of rangeland and forest land soils are in a deteriorating condition. Also, the risk for noxious weed invasion is increased on these sites. Any measures taken to obliterate closed roads will serve to improve watershed conditions. Natural background erosion rates will continue regardless of management action.

### ***Terraces, Outwash Plains and Floodplains***

Livestock trampling has caused some riparian soils to be in detrimental conditions (pedestals and bank shearing) as identified in Bootjack Creek. Grazing and recreation use has also compacted soils and reduced ground cover along Mill Creek and areas near Island Park Reservoir. The trend appears for these conditions to continue without changes in current management strategies.

### ***Ground Cover***

Using ground cover as a measure of stable watershed conditions, most areas of the watershed appear to be stable with a slight upward trend, except for those areas of concern mentioned above. Adequate ground cover occurs on most of the allotments. Areas that have the least ground cover are previously disturbed sites where timber harvest has occurred. Based on ground cover measurements taken in the 1970's and 1980's, most of the ecological types in the watershed are within properly functioning condition criteria for ground cover requirements.

### ***Mass Stability***

Soils that formed on unstable landforms are identified on the Ecological Unit Inventory Map (See in Current Conditions section). Few landslides have been initially identified within the watershed. No mass failures in the watershed have been identified as a result of management activities. Climate is the primary factor that determines the occurrence of landslides in a natural setting. Natural landslides will continue to occur on these areas when climatic conditions cause the surface mantle to become saturated with water, combined with slope stability factors of gravity and surface friction. Factors that create potential for mass movements are listed in the Historic Conditions Section. Mining and prospecting have had a non-detectable influence on the watershed. Most mining have been for decorative rock sources for homes.

### ***Summary***

Generally, undisturbed soils in the watershed are in a productive state that is associated with good watershed health. Localized impacts on soils related to livestock grazing, housing developments, dispersed camping and recreational off-road use have been identified and documented. Private land development has had an impact on the watershed affecting 6.7 percent of the area. Roads and trails represent approximately 0.5 percent of the acres in the watershed. Recreation use, road construction and livestock use have the greatest potential impact on riparian and upland soils. Erosion from upland soils is occurring where soils have been disturbed related to recreation use, roads in timber sales and from intensive livestock use. Erosion potential is highest on soils that formed on the mountains and ridges because of the steeper slopes.

## **Hydrology**

Past timber harvesting, livestock grazing and ATV travel have had the greatest impact to watersheds and streams within the analysis area on NFS lands. Off-Forest, rural development has substantially impacted the watershed and streams. Only a single stream, Tyler Creek, reaches Henrys Fork unaltered by irrigation diversions and/or channelization.

Within the Forest, the watershed and streams are in relatively good condition. Past timber harvesting has affected every stream to one degree or another. The least impacts have been to Coffee Pot and Tyler Creeks. Both of these streams are considered to be in good to excellent condition. Hotel Creek, and its Forks, and Yale Creek are currently carrying substantial sediment loads mostly in the form of fine gravels and sands. Embeddedness is generally greater than 50% in each of these streams. Part of the sediment loading is due to large woody debris that has fallen into the stream, causing debris jams and lateral scouring. However, past timber harvesting and associated roading is also thought to be a substantial contributor. For example, West Fork Hotel Creek has a road paralleling the stream that has washed out, adding hundreds of cubic yards of sediment to the stream. So much sediment has been added to the system that water now subs into the subsurface, leaving over a mile of the channel dry.

## **Vegetation**

### ***Summary and Rationale***

Under the current Targhee National Forest Revised Forest Plan, this landscape has two main goals: 1) Maintaining a semi-primitive natural appearance with non-motorized recreational uses and 2) managing vegetation and activities to primarily benefit the recovery of the grizzly bear. Timber harvest should only be used in limited areas and prescribed fire should be emphasized as the main tool to manipulate vegetation in higher elevations to meet desired future conditions.

### ***Lodgepole Pine***

Currently the lodgepole pine cover type is concentrated in the seedling/sapling and mature age classes with little representation in the mid-aged or pole age classes. This age class imbalance is within the historic range for this cover type. However, patch sizes are smaller and more fragmented than would be generally expected to occur and outside their historical range. Currently patch sizes average approximately 40 acres while historically they averaged approximately 2,000 acres.

### ***Douglas-fir, Mixed Douglas-fir/Lodgepole, and Mixed Conifer***

These cover types comprise approximately 50% of the forested vegetation within the assessment area. These cover types were broken into categories but will be considered together due to similar disturbance patterns and processes. The majority (>95%) of these cover types are dominated by a mature and dense structure. This structure results from previous disturbance history, forest succession, elevation, and aspect changes. Modern fire suppression has had a major effect on these cover types. The fire cycle ranges from 30-50 years. These cover types have missed at least 2 fire cycles. This has led to large areas of dense, multi-storied stand structures in these cover types. These forest structures are currently outside the historical range of variability. The current Douglas-fir beetle epidemic and its effects will be outside its natural range of variability. Large pockets of large mature Douglas-fir mortality will change species composition and long term fuel loading. Douglas-fir regeneration will be limited due to large openings and western spruce budworm outbreaks. The Douglas-fir beetle outbreak will create a major social issue with large amounts of standing dead trees, potential for salvage, and long term effects to wildlife habitat.

### ***Insect Outbreaks and Salvage***

Currently, within the Blue Creek Assessment area, a widespread outbreak of Douglas-fir beetle and western spruce budworm is occurring. The majority of stands with Douglas-fir are moderately to highly susceptible to Douglas-fir beetle and western spruce budworm (at least 70%). Approximately 2,500 acres within the assessment area have at least 70% mortality of Douglas-fir trees greater than 14" DBH. Large, mature Douglas-fir stands are at high risk which could affect the distribution of late seral stands. Wildlife species that prefer large trees and dense forest canopies could be affected by the change. Regeneration of Douglas-fir is at risk due to western spruce budworm outbreak.

To reduce the effects of the current insect outbreaks intensive silvicultural preventive and control treatments should be implemented. However, the amount and size of treatments needed may conflict with current Forest Plan direction. Majority of the assessment area is within grizzly bear management units and 50% of the susceptible stands are in roadless areas. These resource values will need to be weighed against the long term effect of the Douglas-fir beetle and western spruce budworm outbreak. To address reducing stand susceptibility to Douglas-fir beetle and western spruce budworm several steps should be taken. These are:

1. Identify and map stands susceptible to the Douglas-fir beetle and western spruce budworm. Several stand hazard rating systems have been developed using stand exam and other characteristics. Currently most of the stand exam information in the assessment area is 15-20 years old. New stand exam inventory or intensive field reconnaissance should be conducted to determine the hazard rating of stands. Estimating from the quick assessment of the proposed action development for the Centennial Salvage sale approximately 40-50% of these cover types could have stands moderate to high hazard risk.
2. Use forest health protection aerial survey maps or other remote sensing data to identify large pockets of mortality and areas of defoliation. Currently, high resolution satellite imagery is available for about 40-50% of the area. This imagery was taken for the Centennial Salvage sale project area in September 2003.
3. Prescribe treatments based on stand hazard rating and mortality areas. Two main silvicultural treatments should be prescribed in moderate to high hazard stands. The use of prescribed fire should not be used until Douglas-fir beetle populations fall to endemic levels. Thinning to reduce stand basal area and enhance non susceptible host such as aspen. Basal areas should be reduced to 60-80 square feet/acre. Where mortality pockets are occurring, salvage and sanitation treatments should be prescribed. Trees that are infested should be removed before overwintering adults emerge from them, which typically occurs in late April.
4. Prioritize treatment areas. Due to competing resource values treatments should be prioritized. Highest priority areas to treat should be next to the wildland urban interface and forest boundaries and expand outward from there. Treatments within roadless areas should be considered last priority.

### ***Aspen***

The majority of the aspen in the Blue Creek Assessment area is in the mature age classes and only occupies 4% of the forested vegetation area. The lack of disturbance, such as fire, has significantly reduced the area occupied by aspen and has caused existing aspen stands to be homogeneous in age and size. Conifer encroachment is occurring on a significant portion of the existing aspen stands.

### ***Subalpine/Whitebark pine***

Due to the infection of white pine blister rust, mountain pine beetle, and succession whitebark pine in the Blue Creek Assessment area is at high risk. Continued decline in

whitebark pine abundance threatens to dramatically reduce the availability of seeds for many animal species, especially grizzly bear.

### **Aquatic Species and Habitat**

The general habitat trends are positive for most streams. The main threats of increasing degradation is coming from the proliferation of unauthorized ATV trails and roads that are increasing erosion in the watershed and direct runoff into the streams at stream crossings. Areas of proliferation are usually associated with local development. With the trend of private land being subdivided the trend in unauthorized use by ATV's will also increase.

Most of the analysis area is relatively unaffected by grazing. Some evidence of sheep trailing was noted along the bottom of Blue Creek indicating there are likely scattered localized impacts from sheep grazing. However, as a whole the sheep allotments were not noted as degrading fisheries habitat. Detrimental affects from cattle grazing were noted in the Sawtell allotment along "South Sawtell Creek" restoration of part of this channel to its historic location should help alleviate some the impacts but will require closer monitoring. The Bootjack Allotment has the most serious and widespread impacts from grazing of any of the allotments. Stream channel and riparian processes are being negatively affected with no apparent upward trend.

The trend of native Yellowstone Cutthroat is static, as they have been extirpated. The primary cause of this extirpation was the repeated fish eradication projects in Island park reservoir and the Henrys Fork. If brook trout had not been introduced we likely would still have small resident populations of cutthroat isolated in the headwater streams. It will take active management to restore cutthroat to these streams. The best candidate streams are probably those streams that demonstrate some kind of connectivity to the reservoir or the Henrys Fork. The most natural mode for this restoration would be the re-introduction of Yellowstone cutthroat to Island Park Reservoir and the Henrys Fork that demonstrate adfluvial or fluvial life history patterns and would use the tributaries as spawning sites. Some method of brook trout control will also be necessary to assure successful reproduction and survival in these current brook trout streams. Re-introduction of cutthroat would aid in restoring the springtime fishery on the upper Henrys Fork.

Irrigation diversions continue to dewater streams and restrict connectivity on most streams. No changes in water law and water rights are anticipated. However, changing land uses and values of landowners may lead to increased opportunities to restore flow.

### **Terrestrial Species and Habitat**

Gray Wolves have been proposed for delisting in Idaho, Montana and Wyoming by the U.S. Fish and Wildlife Service. When the states assume management of the species,

wolves will be classified as a big-game animal with an appropriate hunting season. This will probably reduce the statewide wolf population to some stable level below the current level of 72 packs but well above the minimum threshold of 10 packs. This management scenario should be acceptable to the general public as well as livestock producers and keep the gray wolf from ever needing the protections of the Endangered Species Act. Localized problems with depredation on livestock will continue and will be dealt with on a case by case basis.

The U.S. Fish and Wildlife Service have proposed delisting of grizzly bears in the Yellowstone Ecosystem. The Final rule for delisting is expected in late spring of 2007. This delisting will not change the way grizzlies are managed in the foreseeable future but does shift management to Idaho Fish and Game.

The increase in both legal and illegal ATV use in the watershed is negatively affecting wildlife habitat within the watershed. The Bootjack/East Sawtell area is the worst portion of the watershed for this illegal use. We have signed and physically closed many miles of illegal trail only to have users re-open or establish new trails. During late summer 2006, coordinated enforcement patrols with Idaho Fish and Game personnel resulted in 22 violation notices being issued during a three week period. Hopefully this kind of enforcement can be continued and will help eliminate the illegal use.

Aspen habitat within the watershed need disturbance to ensure this important wildlife habitat remains a part of the landscape. In many areas of the watershed, conifers are encroaching and shading the aspen clones. Another very important habitat at risk in the watershed is Whitebark Pine. White Pine Blister Rust and mountain pine beetle are both devastating Whitebark pine in the upper reaches of the watershed. Fire, both management ignition and natural may help regenerate stands of Whitebark pine and remove encroaching subalpine Fir.

Currently, the higher elevations within the watershed are suitable to serve as a linkage corridor for wildlife. Lower elevation areas that are impacted by illegal ATV use are not providing the secure habitat needed at the present time. More enforcement and rehabilitation of user created motorized trails will return security within the entire watershed.

Cross-country snowmobiling may be impacting wildlife within the watershed. Mount Jefferson is a very popular destination for snowmobiles within the watershed. There is limited evidence that high levels of disturbance may limit wolverine use especially natal den site selection. Research on this has not yet been completed but future snowmobile use may have to be regulated to maintain this rare species.

## **Range and Livestock**

Grazing activities have been gradually reduced over the last few years in the watershed. Remaining grazing allotments are managed to standards.



## Fire and Fuels

During the summers of 2002-2005, over 400 fuel plots were surveyed within the Blue Creek watershed. Of the 400 plots surveyed to determine tons per acre of fuel loading, an average of 15 tons per acre was calculated. The lowest accumulation was recorded at 2 tons/acre, and the highest was 30 tons/acre.

Within the next two decades, 25 percent of the analysis area will be outside its historical fire interval. With the current fuel loads averaging >15 tons/acre, the fuel bed is at a dangerously high volume for increasing the chances of intense, stand-replacement wildfire. Without restoration through prescribed fire, and or mechanical thinning methods to restore stand structure and allow fire's natural role within the ecosystem, down woody material will continue to increase the fuel bed loads as standing timber falls to the ground due to insects and disease as indicated in Figure 116.



**Figure 116** Typical fuels in the analysis area.

Weather patterns continue to be dryer and warmer. Forest fuels are drying earlier in the spring and not recovering moisture in early spring and summer due to drought conditions experienced throughout the west.

Lightning associated with thunderstorms is common in late June through September, and can result in regular wildfire activity throughout the watershed. Due to the proximity of fire suppression forces and equipment, most fires in the watershed are kept small.



## **Human Uses**

As the population increases, the demand for recreation increases as well. Many of the issues resulting from recreation use in the watershed can be tied to the increase development occurring on private lands adjacent to the watershed.

Some of the dispersed camping sites may need to be hardened in order to allow for the level of use occurring in the area. Better delineation of these sites may also be needed to protect riparian areas. In some cases, closure may be required in order to rehabilitate the site. Management of dispersed sites should be analyzed carefully, as the demand for this type of recreation is not likely to decrease.